

We wish you a start in a
healthy life.



**MR Diagnostics
Incubator System nomag® IC**

Be sure it's no magic!

Content overview

- Company profile
- Product and accessory overview
- Coils overview
- Clinical indications
- Main advantages
- Comparison of MRI examination of newborns
- Benefits for the patient and for the user



About LMT Medical Systems

- LMT develops, manufactures and sells medical products under its own name
- Established in year 2001 with 3 employees
- Located in the city of Luebeck, Germany
- A subsidiary in the USA
- The focus here is to improve the level of patient care for the youngest
- International sales and service in cooperation with distribution partners and MR-manufacturer
- ISO 13485 certified



More than 100 sold units worldwide



Products overview

MR Diagnostics Incubator System nomag® IC

- Patient
weight up to approx. 4.5 kg and head
circumference up to approx. 40 cm
- Air temperature & humidity control
24°C – 39°C
30 – 70%rH

Approved with 1.5T and 3.0T field strength



Products and accessories overview

Trolley for intra-hospital transportation - nomag® TR



Trolley for transportation in ambulance - nomag® TR-A



not for US-Sale

There is an option between a trolley for intra hospital transportation and one for transport by ambulance. The trolley for the ambulance is available for different stretchers (Stollenwerk, Ferno).

Products and accessories overview

Ventilation-Set babyPAC™



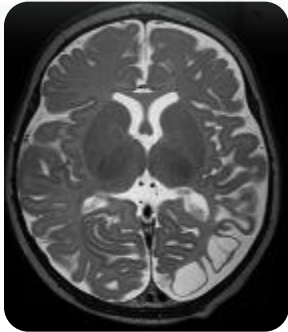
- The babyPAC™ ventilator is designed for ventilation during transportation of neonates and infants up to 20 kg
- Operating modes: CMV+PEEP; IMV, CPAP
- Integrated O₂ blender
- Pressure-controlled ventilation
- There is an option between the use of reusable or disposable ventilation hoses
- Extension pressure hoses with quick connectors for central gas supply are included

Ventilation-Set pNeuton



- The pNeuton ventilator is designed for ventilation during transportation of neonates and infants from 400gr up to 25 kg
- Operating modes: CMV+PEEP; IMV, CPAP
- can support patients non-invasively using nasal prongs
- Integrated O2 blender
- Pressure-controlled ventilation

Neonatal head array coil



Courtesy: UMC, Leiden

- 8-channel receive coil
- High-resolution MR imaging of the brains of premature and term newborns with head circumference up to approx. 40 cm
- Compatible with 1.5T systems:
 - Siemens: Avanto, Espree, Aera, Essenza, Amira
 - Philips: Achieva SW 3.2, Ingenia SW 5.1.7
 - GE: 450 / 450w SW DV 24 / 25 / 26
 - GE: 360 SW SV 24
- Compatible with 3.0T systems:
 - Siemens: TIM Trio, Verio, Skyra, Prisma
 - Philips: Achieva SW 3.2, Ingenia SW 5.1.7
 - GE: 750 / 750w SW DV 24 / 25 / 26

Neonatal head array coil



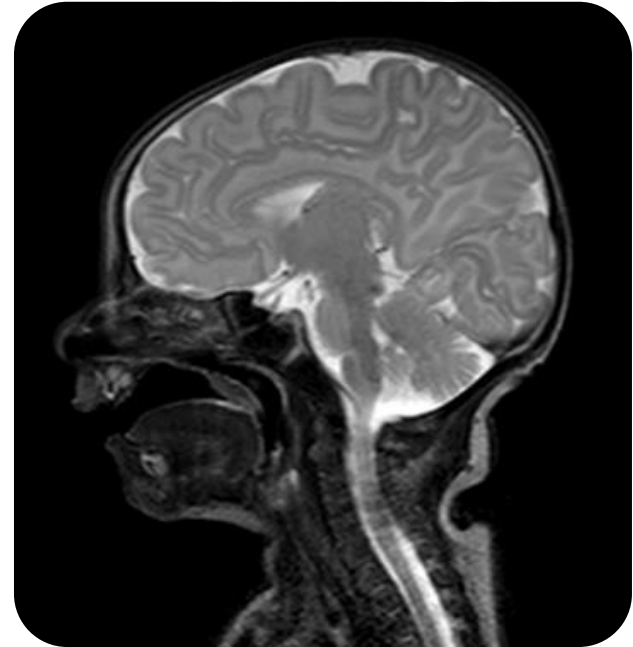
- 16-channel receive coil
- High-resolution MR imaging of the brains of premature and newborns with head circumference up to approx. 42 cm
- Perfect for scanning intubated patients
- Improved SNR and image homogeneity: 35% increased SNR compared to 8k NHAC (tested on: Siemens Skyra)
- 17% extended field of view compared to 8k NHAC

- Compatible with 1.5T systems:
 - Siemens: Avanto, Espree, Aera, Essenza, Amira
- Compatible with 3.0T systems:
 - Siemens: TIM Trio, Verio, Skyra, Prisma

Neonatal head array coil

Highest quality MR imaging

- Surrounds the infants head completely
 - Better signal in the parietal region of the brain
 - Additional sequences without repositioning
 - Suitable for clinical routine imaging as well as for research (e.g.: MRS, fMRI, DTI)



3.0T PMS

T2W_TSE_sag, RES: 432x432
TR/TE: 12594.27/100.00 ms
FOV: 180.00 mm x 180.00 mm

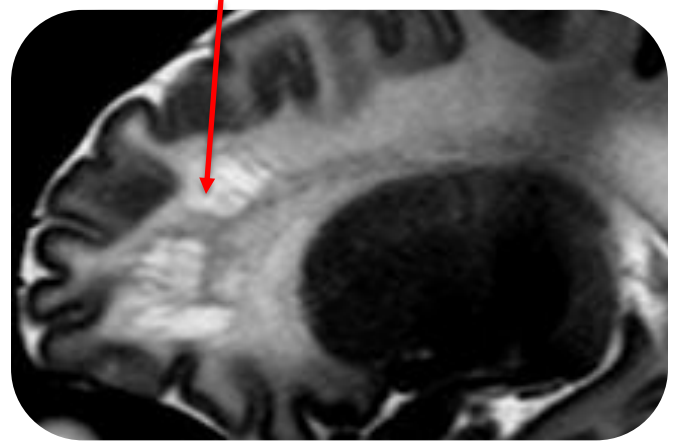
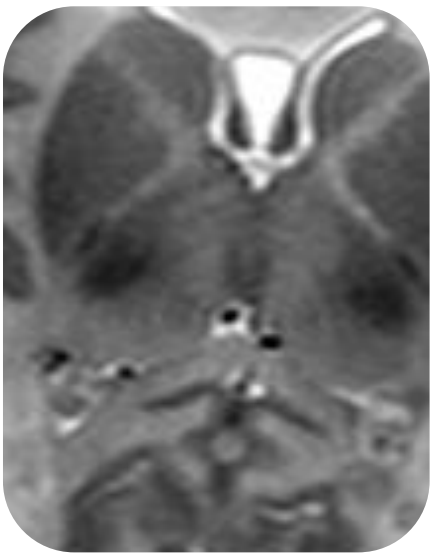
Courtesy: UKSH, Campus Lübeck

Ischemic and Hypoxic Lesions

Venous Infarction Deep Medullary Veins

neonatal acute stage

2 weeks follow-up
deep medullary veins



FSE - T2

ADC

white matter edema (intramyelinic?)

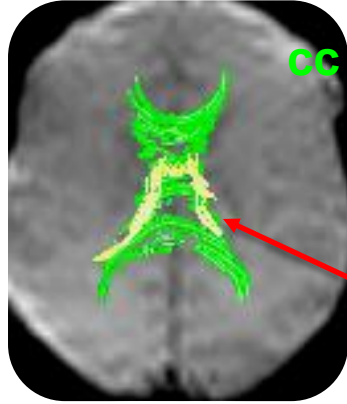
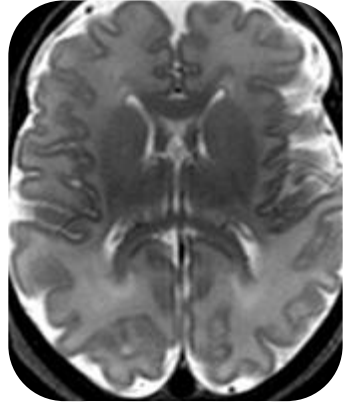
FSE-T2

Idiopathic venous infarction (sometimes with sinus thrombosis), sometimes with periventricular haemorrhage.

Neonatal fiber tracking, congenital dysmorphism



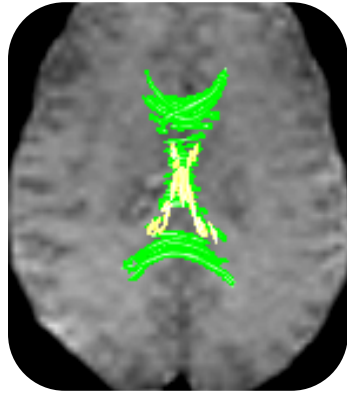
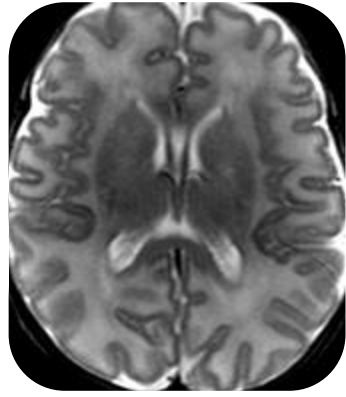
syndromatic neonate



dysmorphic fornix and commissure

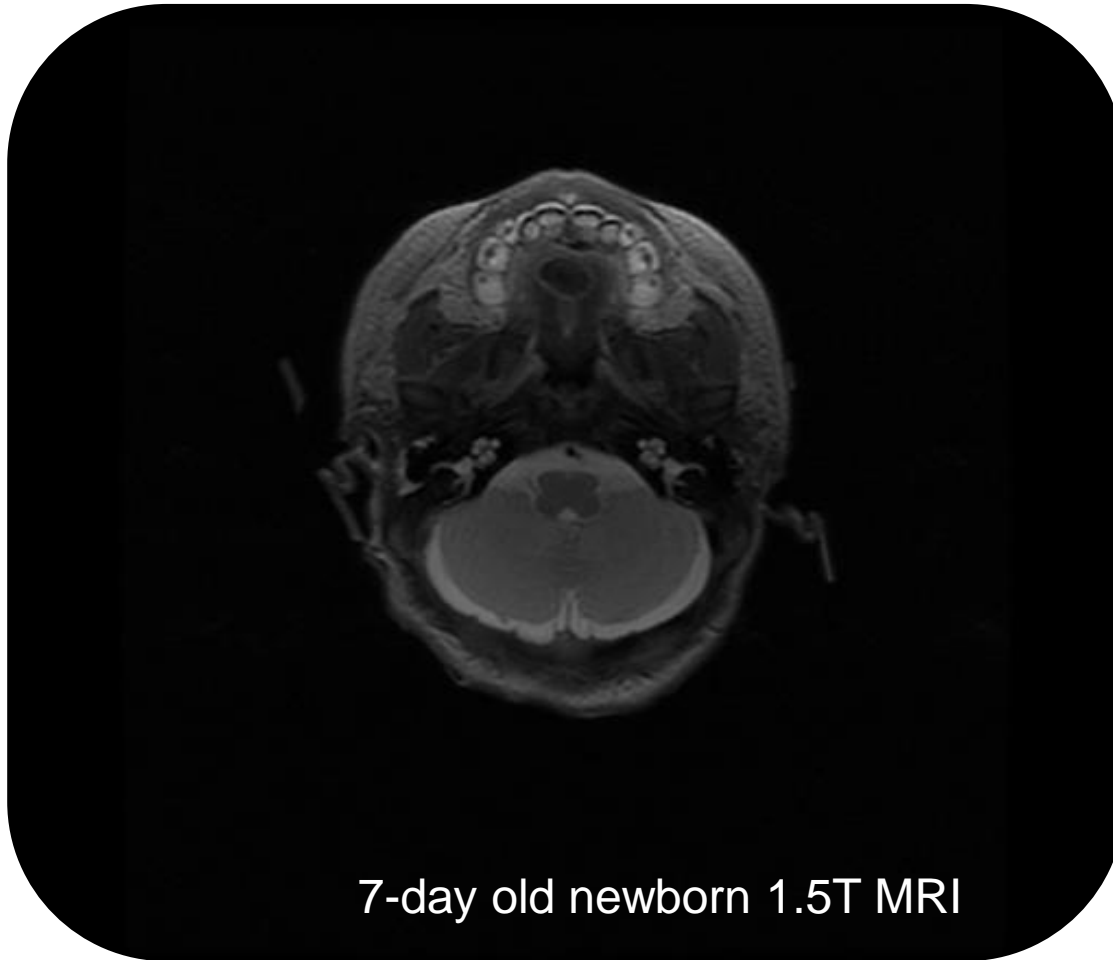
normal

3 mm FSE-T2



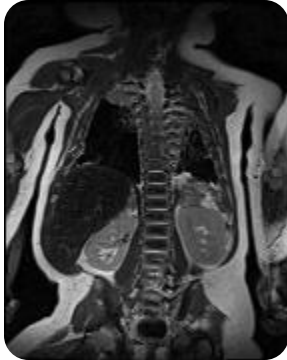
fiber tracking

Neonatal head array coil



Courtesy: Scientific Center of Obstetrics, Gynecology and Perinatology, Moscow

Neonatal body array coil



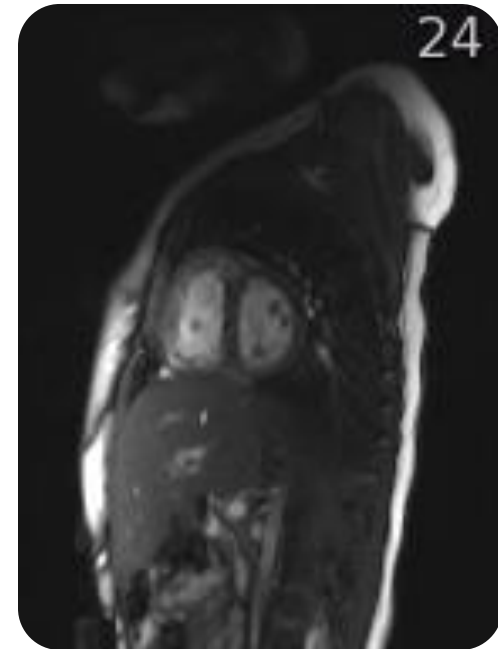
Courtesy: Clinical Hospital Center, Zagreb

- High-resolution MR imaging of the bodies of newborns and premature babies, up to a weight of approx. 4.5 kg
- 12-channel body array coil , can be used separately or together as appropriate, comprised of:
 1. 8-channel spine coil integrated in patient's bed
 2. 4-channel flex coil
- Compatible with 1.5T systems:
 - Siemens: Avanto, Espree, Aera, Essenza, Amira
 - Philips: Achieva SW 3.2+, Ingenia SW 5.1.7+
 - GE: 450 / 450w SW DV 24 / 25 / 26
 - GE: 360 SW SV 24 / 25
- Compatible with 3.0T systems:
 - Siemens: TIM Trio, Verio, Skyra, Prisma
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 - GE: 750 / 750w SW DV 24 / 25 / 26

Neonatal body array coil

Highest quality MR imaging

- The spine and the flexible coils surround the new-borns and premature babies body completely
 - Improved signal e.g. in the heart, lung, abdomen, thorax
 - Better informative examination in case of suspected metabolic disease, thrombosis and injuries or malformations requiring surgical interventions



1.5T SMS

Short axis cine, RES: 192x144
TR/TE: 34.10/1.43 ms
FOV: 200.00 mm x 150.00 mm

Courtesy: Rikshospitalet, Oslo

Neonatal body array coil



Courtesy: Scientific Center of Obstetrics, Gynecology and Perinatology, Moscow

Clinical indications for neonatal MRI

- Prematurity, < 30 weeks' gestational age
- Hypoxic-ischaemic encephalopathy stage 2 or 3 in (near) full-term neonates
- US diagnosis of significant parenchymal brain injury, such as inhomogeneous periventricular echo densities, cystic PVL, periventricular haemorrhagic infraction, arterial infraction
- US diagnosis of severe post-haemorrhage ventricular dilatation
- Traumatic delivery
- Clinical or US suspicion of abnormalities in the posterior fossa
- Clinical or US suspicion of abnormalities at the brain's convexity
- Severe and/or symptomatic hypoglycaemia
- (Suspected) metabolic disease
- Clinical or US suspicion of brain inflammation (meningitis, encephalitis, brain abscess)
- Congenital malformations with possible involvement of the brain
- Neurological signs of encephalopathy, such as seizures, abnormal consciousness and/or asymmetry, not sufficiently explained by US findings

The MRI-compatible neonatal incubator in practice; A. Lane, L.R. Chuk, P. Colditz, A.Coulthard, Journal of Pediatrics and Child Health

Study on advantages of MRI diagnostics for neonates

Facts about “Vienna General Hospital”*

Diagnosis	n	Change in management	%
Seizures	29	19	65
Asphyxia	19	11	57
Metabolic Disease	6	6	100
CNS Infection	6	4	66
Trauma	2	2	100
Malformation	20	17	85
Thrombosis	7	7	100
Tumor	8	7	87
Posthemorrhagic Hydrocephalus	14	13	92
Infarction	3	2	66

* The MR-compatible incubator in the “Vienna General Hospital”, K. Klebermass, D. Prayer, M. Weninger, A. Pollak – Medical University of Vienna, Z. Rona – Semmelweis University, Budapest

MR examination procedure of a newborn

	with nomag [®] IC	without nomag [®] IC
➤ Transfer from NICU incubator to transport incubator	x	x
➤ Sedation of the patient	x	x
➤ Transport from the NICU to the MR room	x	x
➤ Transfer from transport incubator to the MR table		x
➤ General anesthesia (often)		x
➤ Positioning of the coil, fixation and manual ventilation if necessary		x
➤ Examination with possible delays due of repositioning and additional sedation if necessary		x
➤ Transfer from the MR table to the transport incubator		x
➤ Transport from the MR room to the NICU	x	x
➤ Transfer from transport incubator to NICU incubator	x	x

Benefits for the patient

- Optimizes the thermoregulation during the MR examination*
- Less sedation and no general anesthesia necessary*
- Same environment as in the NICU incubator
- Minimizes the direct physical contact with the newborn
- Better auditory shielding*
- Reduced infection risk
- Decreased total examination time*



*Z. Rona et al., "Comparison of neonatal MRI examinations with and without an MR compatible incubator: Advantages in examination feasibility and clinical decision-making"

Benefits for radiology

- No preparation of the newborns and premature babies in the MR room
- Shorter mean imaging in the MR room*
- More examinations due to the improved workflow
- Decreased examination time*
- Improved image quality



*Z. Rona et al., "Comparison of neonatal MRI examinations with and without an MR compatible incubator: Advantages in examination feasibility and clinical decision-making"

Benefits for neonatology

- More accurate diagnostics due to the high imaging quality*
- More exact diagnosis possible with the MRI than with sonography**
- Earlier diagnostics possible due to the safe environment
 - even of critically ill and unstable newborns*
- Due to shorter procedure reduced staff required



*Z. Rona et al., "Comparison of neonatal MRI examinations with and without an MR compatible incubator: Advantages in examination feasibility and clinical decision-making"

**Mark Born et al., "Cerebral MRI of Preterm Neonates at Term Equivalent Age at 3 Tesla: Hints at White Matter Damage on T2- and Diffusion Weighted Images"

Benefits for hospital management

- Improved workflow
- Less staff necessary*
- Possible earlier patient discharge*
- Improved reputation **



*Z. Rona et al., "Comparison of neonatal MRI examinations with and without an MR compatible incubator: Advantages in examination feasibility and clinical decision-making"

**Best Children's Hospitals ranking U.S. News & World Report



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